

Review Article

A Review on Opportunities, Challenges, and Future Prospects of Soybean Production in Ethiopia

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Abstract

Soybeans are an important crop that contributes significantly to nutrition, agriculture, and other sectors. Their versatility and nutritional profile make them an important part of diets all around the world. As worldwide demand for sustainable food sources grows, soybeans' relevance is projected to increase, emphasizing the need for ongoing research and innovation in soybean cultivation and processing. As Ethiopia's agricultural sector undergoes transformation, soybean production emerges as a key driver of economic growth and food security. The country's favorable climate and diverse agro-ecological zones offer immense opportunities for farmers and investors to capitalize on the rising global demand for soybeans. However, the sector faces challenges such as limited access to quality seeds, inadequate agricultural infrastructure, and fluctuating market prices, which hinder sustainable production. This review examines the opportunities, challenges, and future prospects of soybean production in Ethiopia, highlighting the need for improved agricultural practices, pest management strategies, and infrastructure development to overcome these obstacles. By addressing these challenges, Ethiopia can unlock its full potential in soybean production, contributing to food security, economic growth, and poverty reduction. This review provides insights for policymakers, farmers, and investors to harness the potential of soybean production in Ethiopia and ensure a sustainable and profitable future for the sector.

Keywords

Soybean, Challenges, Opportunities

1. Introduction

Soybeans [*Glycine max* (L.) Merrill] originated in Asia and were later introduced into North America, Europe, and then South and Central America [11]. It is one of the most essential beans in the world in terms of production and trade and has become the dominant oilseed [5, 9]. It has a long history in Africa, with the first recorded production on the continent in 1858 in Egypt and South Africa [7]. In Ethiopia, the introduction of soybean germplasm work is believed to have been initiated in the 1950s by the Ethiopian Institute of Agricultural

Research (EIAR); however, other breeding research has been launched recently in the 1970s. [2, 7]. Ethiopia's agricultural landscape is undergoing significant transformation, with soybean production emerging as a key sector for economic growth and food security. The country's favorable climate and diverse agro-ecological zones provide an ideal environment for soybean cultivation, presenting numerous opportunities for farmers and investors alike. As global demand for soybeans continues to rise, Ethiopia stands at a crossroads, ready

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to capitalize on this lucrative market [14].

There are several advantages to growing soybeans in Ethiopia, including improved nutrition, increased economic growth, and environmental sustainability. Adopting soybean as a major crop can increase food security and economic resilience for both farmers and communities as the nation keeps growing its agricultural sector. With the correct assistance and funding, soybeans in Ethiopia have enormous potential and could be very important to the country's agricultural future [10].

However, the journey toward enhancing soybean production is not without its challenges. Factors such as limited access to quality seeds, inadequate agricultural infrastructure, and fluctuating market prices pose significant hurdles for farmers. Additionally, the need for improved agricultural practices and pest management strategies is critical to ensure sustainable production [1]. Addressing these challenges will be essential for Ethiopia to fully realize its soybean potential.

Looking ahead, the future prospects of soybean production in Ethiopia appear promising, driven by government initiatives and increasing interest from the private sector. With targeted investments in research, technology, and training, the country can enhance its production capacity and improve the livelihoods of countless farmers [12]. This article delves deeper into the opportunities, challenges, and future prospects of soybean production in Ethiopia, exploring how the nation can navigate this evolving agricultural landscape.

2. Advantages of Soybean Production in Ethiopia

Soybean production in Ethiopia presents significant advantages for agricultural development, economic growth, and food security [3]. With the increasing global demand for soybeans, coupled with the country's favorable climatic conditions and available arable land, Ethiopia is well-positioned to become a leading producer of this versatile crop. This document explores the various benefits associated with soybean production in Ethiopia, including economic benefits, nutritional advantages, and potential for export.

3. Economic Benefits

Job Creation: The expansion of soybean production can create numerous job opportunities in farming, processing, and distribution. This can help reduce unemployment rates and improve livelihoods in rural areas.

Income Generation: Soybean farming can provide farmers with a lucrative source of income. Given the high market demand for soybeans, farmers can benefit from higher prices and increased sales.

Value Addition: The establishment of processing facilities for soybean products, such as oil and meal, can enhance the value chain. This not only increases profitability for farmers

but also stimulates local economies.

Export Potential: With the global market for soybeans growing, Ethiopia has the potential to export soybeans and soybean products, thereby earning foreign exchange and improving the trade balance.

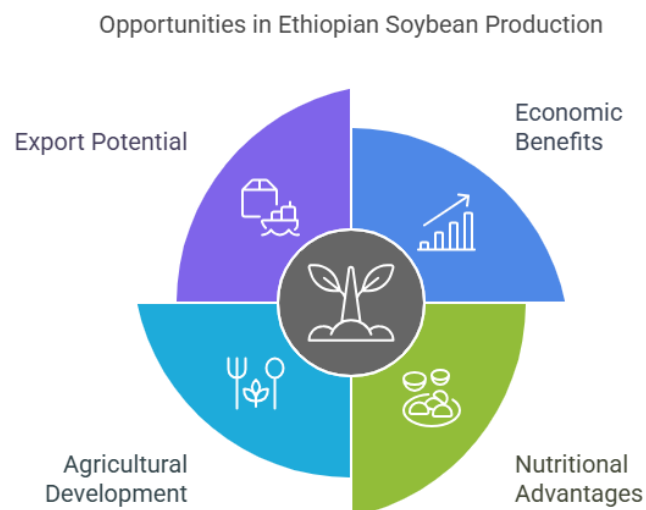


Figure 1. Benefits of soybean production.

4. Nutritional Advantages

Protein Source: Soybeans are an excellent source of protein, making them a vital component of the diet, especially in a country where malnutrition is prevalent. Increasing soybean production can help improve food security and nutrition.

Diverse Uses: Soybeans can be processed into various products, including tofu, soy milk, and animal feed. This versatility allows for a wide range of dietary options and can cater to both local and international markets.

Sustainable Agriculture: Soybeans can improve soil health through nitrogen fixation, reducing the need for chemical fertilizers. This contributes to sustainable farming practices and enhances soil fertility for future crops.

5. Agricultural Development

Research and Development: Investment in agricultural research can lead to the development of high-yield and disease-resistant soybean varieties, which can significantly boost production levels [13].

Training and Education: Providing farmers with training on modern farming techniques and best practices can enhance productivity and ensure sustainable soybean cultivation.

Infrastructure Improvement: Developing infrastructure such as roads, storage facilities, and irrigation systems can facilitate better access to markets and reduce post-harvest losses.

6. Opportunities of Soybean Production in Ethiopia

Ethiopia, with its diverse agro-ecological zones, has the potential to become a significant player in the global soybean market [4, 8]. Soybean production in the country presents numerous opportunities. This review explores these aspects in detail.

Availability of improved soybean varieties in Ethiopia: So far in Ethiopia, twenty-five soybean genotypes have been released as a direct introduction. When a variety has been

registered in another country and has entered general cultivation, it is wasteful to start the entire release procedure from a zero baseline. The released soybean variety as a direct introduction doesn't increase production and productivity, as expected due to the susceptibility to diseases and insect pests. The challenge of the direct introduction of soybean, both the commercial as well as the exotic, is there is no assigned government body for the introduction and explorations. So, the fragmented research systems are now trying to introduce parental lines for hybridization [15].

Table 1. Name of varieties, maturity type, altitude maintainer, and year of release of soybean.

S. N.	Variety	Maturity Type	Altitude (m.a.s.l.)	Breeder/ Maintainer	Year of Release
1	Gizo (TGX-1885- 33F)	Medium	520-1800	PARC/EIAR	2010
2	Gishama (PR-143- (26))	Medium	520-1800	PARC/EIAR	2010
3	BOSHE (IAC-13-1)	Medium	1200- 1900	BARC/OARI	2008
4	Dhidhessa (PR-143- 81-EP-7-2)	Medium	1200- 1900	BARC/OARI	2008
5	Awassa-95 (G 2261)	Early	520-1800	AwARC/SARI	2005
6	AFGAT (TGX1892-10F)	Medium	750-1800	AwARC/SARI	2007
7	KORME (AGS-129- 2)	Medium	1200- 1900	BARC/OARI	2011
8	Davis	Medium	1000- 1700	AwARC/SARI	1981/2
9	Cheri (IPB-81-EP7)	Medium	1300- 1850	BARC/OARI	2003
10	ETHIO YUGOSLAVIA	Late	NA	BARC/OARI	2007
11	KATTA (PR-145-2)	Medium	1200- 1900	BARC/OARI	2011
12	AGS-7-1	Early	1200- 1700	HWARC/SARI	2012
13	NOVA	Early	1200- 1700	HWARC/SARI	2012
14	Wello (TGX-1895- 33F)	Medium	520-1800	SARC/ARARI	2012
15	Belessa-95 (PR-149)	Late	520-1800	AwARC//SARI	2003
16	Wegayen (TGX1998-29F)	Late	520-1800	PARC/EIAR	2010
17	Clark 63k	Medium	100-1700	AwARC//SARI	1981/2
18	Coker -240	Medium	700-1700	AwARC//SARI	1981/2
19	Williams	Early	1000- 1700	AwARC//SARI	1974
20	Jalale (AGS-2017)	Medium	1300- 1850	BARC/OARI	2003
21	Crowford	Early	700-1700	ARARC//SRARI	1974
22	Gazale	Early	800-1700	AwARC and PARC	2015
23	Pawe 01 (PARC2013-2)	Early	520-1800	PARC/EIAR	2015
24	Pawe 02 (PARC2013-3)	Early	460-1600	PARC/EIAR	2015
25	Nyala	Medium	NA	AwARC and ARC	2014
26	Hawasa-04 (AGS-7- 1)	Medium	NA	AwARC	2012

Note: EIAR = Ethiopian Institute of agricultural Research, PARC=Pawe agricultural research center, AwARC= Awassa agricultural research center, BARC= Bako agricultural research center, SARI= south agricultural research institute, OARI= Oromiya agricultural research institute. Source: MOANR (2016), NA=Not available.

Favorable Agro-Climatic Conditions: Ethiopia's varied climate and soil types are conducive to soybean cultivation. The regions of Benishangul-Gumuz, Oromia, Amhara and southwest Ethiopia offer ideal conditions for growing soybeans, which can thrive in both rain-fed and irrigated systems [6].

Growing Domestic and International Demand: There is an increasing demand for soybeans in both the domestic market and international markets. Domestically, soybeans are used in food products, livestock feed, and as a source of cooking oil, which is encouraging local farmers to increase production. Additionally, Ethiopia's strategic location near major markets in the Middle East and Asia presents export opportunities.

Government Support and Policies: The Ethiopian government has recognized the potential of soybean production and has implemented policies to support its growth. These include providing improved seed varieties, offering training for farmers, and facilitating access to credit and market information.

Potential for Crop Rotation and Soil Improvement: Soybeans are excellent for crop rotation as they help improve soil fertility through nitrogen fixation. This benefit can lead to improved yields of subsequent crops, making soybeans an attractive option for Ethiopian farmers looking to enhance their overall productivity.

7. Challenges of Soybean Production in Ethiopia

Limited Access to Quality Seeds and Inputs: One of the major constraints is the limited availability of high-quality seeds and agricultural inputs. Many farmers lack access to improved seed varieties that are resistant to pests and diseases, which affects their productivity.

Inadequate Infrastructure: Poor infrastructure, such as roads and storage facilities, hampers the efficient transportation and storage of soybean crops. This can lead to post-harvest losses and limits market access for farmers.

Knowledge and Skill Gaps: There is a need for more widespread training and education among farmers regarding modern soybean farming techniques. Many farmers lack the knowledge required to optimize their yields and manage pests and diseases effectively.

Market Fluctuations and Price Volatility: Soybean farmers in Ethiopia are often subjected to market fluctuations and price volatility, which can discourage investment in soybean cultivation. This uncertainty can be a barrier to expanding production.

8. Future Prospects

Expansion of Cultivation Areas: With suitable land available, there is significant potential for expanding the area under

soybean cultivation. This expansion can be achieved through both horizontal (increasing land area) and vertical (improving yield per hectare) growth.

Development of Processing Industries: Investing in soybean processing industries within Ethiopia can add value to the crop, increase employment opportunities, and boost the local economy. The development of such industries would also reduce reliance on imports of soybean products.

Strengthening Research and Development: Enhancing research and development efforts to produce more resilient and higher-yielding soybean varieties is crucial. Collaborations with international agricultural research organizations can accelerate these advancements.

Focus on Sustainable Practices: Adopting sustainable agricultural practices can help ensure the long-term viability of soybean production in Ethiopia. Practices such as conservation agriculture, integrated pest management, and efficient water use can contribute to environmental sustainability.

Enhanced Market Linkages: Improving market linkages through better infrastructure, cooperative development, and access to market information can help farmers secure better prices and reduce post-harvest losses. This would encourage more farmers to engage in soybean production. In conclusion, while there are challenges to overcome, Ethiopia's soybean production has considerable potential for growth. By addressing constraints and leveraging opportunities, the country can significantly enhance its role in the global soybean market and contribute to its economic development.

9. Conclusion

Ethiopia's soybean production holds significant potential for growth, despite its challenges. By addressing constraints such as limited access to quality seeds, inadequate infrastructure, and market fluctuations, and leveraging opportunities like favorable agro-climatic conditions and government support, Ethiopia can enhance its role in the global soybean market. Investing in research and development, sustainable practices, and market linkages will be crucial for the country to realize its full soybean production capacity and contribute to its economic development.

Abbreviations

EIAR	Ethiopian Institute of Agricultural Research
MOANR	Ministry of Agriculture and Natural Resource
USG	Ultrasonography
DSA	Digital Subtraction Angiography
LDPRBC	Leucodepleted Packed RBC
CT	Computed Tomogram

Author Contributions

Getachew Shiferaw Mekonen is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

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